



CX-1X2000

Mini Heading-Hold
Gyro System

INSTRUCTION MANUAL



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1. Introduction

Thank you for purchasing the CopterX CX-1X2000 Mini Heading-hold Gyro. CX-1X2000 is an AVCS (Angular Vector Control System) gyro with small volume, light weight and advanced performance. Its high-speed processor can process the signal with high frequency and control the tail accurately. NEW direction switch (DIR), allows pilot to set the direction of the tail rotor servo. NEW digital servo switch (DS), allows pilot to set it for either a digital servo or a non-digital servo. NEW travel trim (LIMIT), allows pilot to set the amount of travel for the tail rotor servo. CX-1X2000 can be easily programmed by a transmitter or a program box (sold separately), it can work well with both electric and nitro R/C helicopters.

2. Features

- New direction switch (DIR), allows pilot to set the direction of the tail rotor servo
- New digital servo switch (DS), allows pilot to set it for either a digital servo or a non-digital servo
- NEW travel trim (LIMIT), allows pilot to set the amount of travel for the tail rotor servo
- Micro AVCS heading hold gyro
- Compact design to work most helicopter from 100-600 size
- Aluminum casing for accurate vibration free operation
- User selectable between AVCS or Normal mode
- Easily programmable without the aids of complex setup box
- Fully compatible from analog to narrow band digital servo (1.52ms analog, 1.52ms digital, 760us, 960us)
- Compatible with most popular PPM, PCM, 2.4G radio system
- Wide operation voltage from 3.5V to 10V DC

3. Specification

Dimensions: 22.2*22.2*9.3mm

Weight: 10g (metal case, cables and plugs included)

Operating Voltage: DC3.5V - 10V

Operating Current Drain: 60ma

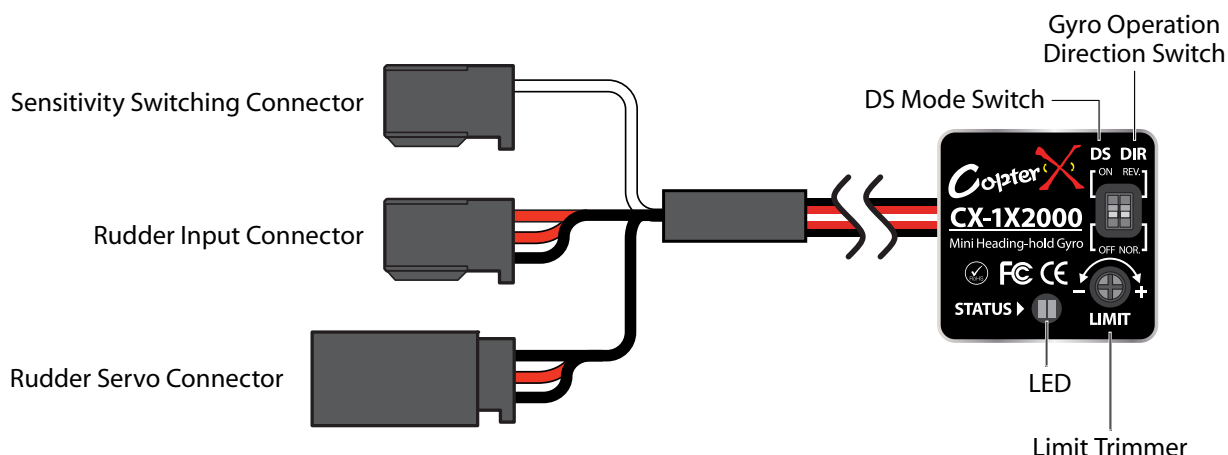
Operating Temperature: -10°C - 50°C

Maximal Angular Velocity: 800°/sec

Servo Compatibility: 1.52ms analog servo, 1.52ms digital servo, 760us digital servo, 960us digital servo

Radio Compatibility: PPM, PCM, 2.4G

4. Functions and Connections



Sensitivity Switching Connector: Gyro sensitivity switching signal input connector. Connect to the receiver sensitivity switching channel (normally CH5). This connector is also simultaneously used to switch between the AVCS and normal operation modes. Since this connector is a single wire signal line, do not pull it forcefully.

Rudder Input Connector: Connects to the receiver rudder channel (CH4) output connector.

Rudder Servo Connector: Connects the rudder servo.

DS Mode Switch (DS): Digital servo (DS) mode switch. The ON position is the high-speed output mode for digital servo only. When using a normal servo, always set this switch to the OFF position. If it is set to the ON position, the servo will be destroyed.

Gyro Operation Direction Switch (DIR): Switches the gyro control direction. It must be switched according to the direction of rotation of the main rotor and the direction of the rudder linkage. If the rudder servo moves in the cancellation direction when the nose of the helicopter moves, the operation direction are good. If you try to fly a model with a clockwise rotation rotor when the gyro operation direction is reversed, the nose will turn to the left and result in a dangerous situation.

LED: Indicates the operating status of the CX-1X2000. The display contents are shown in section 5.

Limit Trimmer (LIMIT): Sets the maximum travel of the rudder servo. Move the rudder stick to the left and right and adjust the limit trimmer so that the servo operating angle do not strike the linkage. During flight, the servo will not operate beyond this angle and the linkage is protected. When the trimmer is turned clockwise, the servo operating angle increases.

5. LED Indication

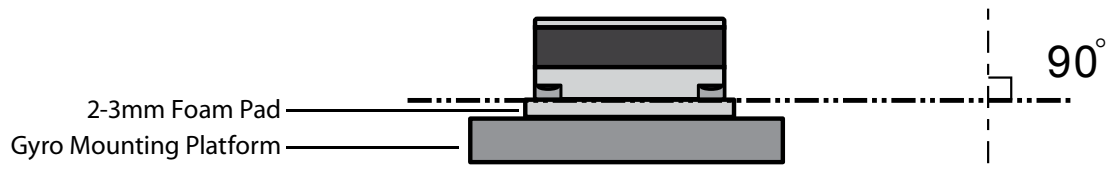
Steady Red	Gyro is in AVCS mode
Steady Blue	Gyro is in normal mode
Steady Red and Blue	Gyro is waiting for receiver's signal
Blue and Red LED are flashing synchronously	Gyro is initializing, keep the gyro steady, rudder stick centered
Red LED is flashing	Gyro is in firmware update mode

6. Gyro Mounting

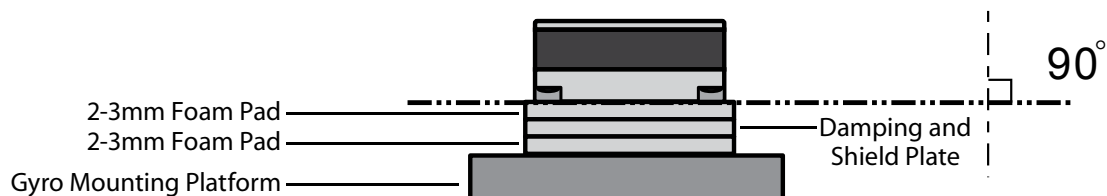
The gyro should mount to a steady platform which is perpendicular to the main shaft and far away from the engine and other electric devices.

Mount the gyro to the platform by using a soft foam pad, relax the cable of gyro to reduce transmission of vibrations through the cable. Do not allow the gyro case to touch other parts of the helicopter.

Mounting on a small electric helicopter: just use a 2-3mm foam pad.

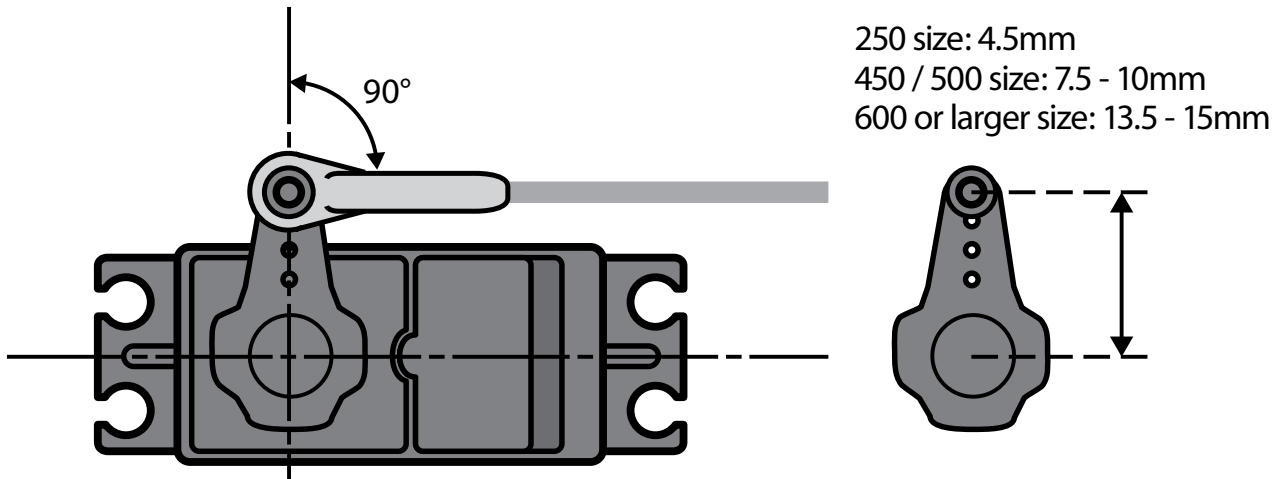


Mounting on a large or a High vibration helicopters: use a foam pad on each side of the damping shield plate.



7. Installation of Servo Horn and Linkage

First of all make sure the mechanical parts of tail rotor install correctly, all parts can move smoothly, and the tail servo install firmly.



Mount control ball to servo horn. We recommend the distance from the ball to center is: 4.5mm (250 size), 7.5 - 10mm (450, 500 size), 13.5 - 15mm (600 or larger size).

Install the horn to tail servo temporarily, adjust the horn position to make it perpendicular to the linkage, then set the tail pitch to be approximately 8° in the direction that compensates the main rotor torque by adjusting the linkage length.

Notice: Don't connect the servo to the gyro until finishing the gyro type configuration.

8. Transmitter Configuration

Power on the transmitter and create a new helicopter model, set the trims and subtrims of all the channels to be zero, and make sure all the mixing functions related to tail turn off. Set up a gain switch in transmitter, which is used to control gyro's working mode (AVCS mode and normal mode).

The relationship of the gyro actual gain and the displayed value in some popular transmitters are in the table as follows. We recommend that you can set the gyro actual gain to be about 40%, and then adjust the gain during practical flight. The gain should be raised until the tail begins to oscillate quickly (also called Tail Wag). Once this point has been achieved, reduce the gain a little and do a test fly again. Check and set the gain for each flight mode.

	Gyro is in AVCS mode			Gyro is in AVCS mode	
Gyro actual gain	100	93	0	96	100
Futaba gyro menu	85%		0%		85%
Futaba Endpoint	100%		0%		100%
JR / Spektrum gyro menu		0%	51%	100%	
JR / Spektrum Endpoint	104%		1%		108%

9. Parameter Configuration

9.1 Set parameters by using gain switch and rudder stick of transmitter

9.1.1 Entering Programming Mode

Power on transmitter and dial the switch to AVCS mode, connect the gyro to receiver (before selecting the servo type, disconnect the gyro to servo), move the rudder stick to any maximum extent position and remain it, power on the gyro and the receiver, after the gyro initialization, red and blue LED indicator are off and then they flash alternately again, it shows that gyro has entered Programming mode, now center the rudder stick.

9.1.2 Change parameter

Change the parameters by moving rudder stick right or left in every item of menu.

9.1.3 Switch to the next menu and save the change

Dial gain switch for one time between AVCS and normal mode can save the parameters set in previous menu, and enter into next menu at the same time.



9.1.4 LED indicator in Programming Mode

Red and Blue flash slowly together: switch to a new menu items, the number of flashes is the sequence number.

In menu item 1, 2, 7, the number of flashes indicates the parameter of current item.

In item 3, 4, 5, 6, fast Red flashes indicate parameter value increasing, fast Blue flash indicates value decreasing.

Number of red and blue flash synchronously	Menu item	Description of parameter and condition
1 flash	Servo type	Red, 1 flash: 1520us 71Hz (analog servo)* Red, 2 flashes: 1520us 250Hz (digital servo) Red, 3 flashes: 1520us 333Hz (digital servo) Red, 4 flashes: 760us 400Hz (digital servo) Red, 5 Flashes: 960us 333Hz (digital servo)
2 flashes	Gyro Compensation Direction	Long Red, 1 flash: positive direction* Long Blue, 1 flash: reverse direction
3 flashes	Servo trim	Servo centered
4 flashes	Limit A of servo	Servo goes to the limit position of direction A
5 flashes	Limit B of servo	Servo goes to the limit position of direction B
6 flashes	Compensation of pitch to tail	Servo centered, move the pitch stick up and down to check the value and direction of compensation
7 flashes	Parameter group selection	Red, 1 flash: parameter group 1 is selected (F3C mode)* Red, 2 flashes: parameter group 2 is selected (3D mode)
8 flashes	Data reset	Move rudder stick right and left quickly for several times, until the Blue LED flashes fast, then all the parameter is reset to the factory default settings

NOTICE

- *Factory default setting
- Before finishing the servo type selection, don't connect the servo to the gyro
- Before finishing the item 3 of the menu, don't fix the horn to the servo
- In Programming mode, the gyro couldn't control the helicopter, don't try to fly in Programming mode
- The menu is circular, it goes back to the item 1 automatically after item 8
- When you want to save the parameters you just setting, you must dial the gain switch between AVCS and normal modes for one time, at the same time it goes to next item of menu
- The item 6 is an optional function, when it is set, the tail control can be enhanced during the acute pitch changing in 3D flight. For beginners, we recommend setting it to default, if it is set incorrectly, please enter item 8 to reset the parameter to default. If you want to use this function, you need to setup a mixing from pitch channel to a vacant channel in transmitter, and plug the gyro pitch signal wire to this vacant channel of receiver.
- In the item 7, for beginner we recommend selecting parameter group 1 (F3C mode)
- After finishing the setup and saving the parameters, you must turn off the power and restart the gyro to fly.

9.2 Set parameters by using program box, please check the program box user manual for more details.

10. Notices in each flight

When turn on the power, the gyro needs several seconds to initialize. During initialization, Red and Blue LED flash synchronously. When initialization is complete, the tail servo will move right and then left to indicate.

If the airframe is not immobile or the rudder stick is moved during initialization, the gyro may drift. Remain the airframe immobile and the rudder stick centered, then quickly dial the gain switch between Normal Mode and AVCS Mode for several times, the gyro will initialize again to eliminate drift.

Before every flight, verify that the mechanical frame and parts of helicopter is in good condition.



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